

Light Plane Maintenance[®]

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Paradigm Shift Charger

A revolutionary 28-volt charger/power supply is a gamechanging design in battery charging—the 28252-AA-S4.

by LPM Staff

“VDC coordinated their efforts with the aircraft battery makers to assure not only optimal charging profiles but charging profiles that will enable aircraft batteries to survive longer than a few years before they become unairworthy...”

“... Note that not only deep discharges promote sulfation, but leaving a battery in the discharged state is about the worst type of sulfation promotion action mistake you can make.”

“...This is a ground-breaking design with terrific capabilities that should easily double the effective life of your 24-volt batteries...”

“... We are just really impressed by this product.”

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For a number of years, we have recommended using aircraft-specific battery chargers manufactured by VDC Electronics, also known as BatteryMINDER, as they have for years dedicated a significant portion of their resources and R&D efforts to developing dedicated aircraft battery chargers. These specialized chargers have all the desirable attributes, including computer chip controlled, smart, multistage charging and desulfating circuits custom designed for aircraft batteries.

VDC coordinated their efforts with the aircraft battery makers to assure not only optimal charging profiles but charging profiles that will enable aircraft batteries to survive longer than a few years before they become unairworthy as defined by specific manufacturer load testing that is supposed to be conducted annually. (See the paperwork included with your battery under the instructions for continued airworthiness.) It essentially requires the battery retain 80 percent of its rated amp-hour capacity to pass inspection.

And this is a good thing, because without this testing you could have a battery that will generally start the plane, but fail very fast when the alternator or generator fails and you are on battery power alone. Unfortunately, this test is still not widely done because the tester costs

nearly \$1000, and shops are loath to buy expensive equipment to do one thing.

Some arguments can be made that this battery testing requirement only applies only to part 23 certified aircraft, but the reality is if you are not testing your battery periodically, then you take unnecessary risks of being without back up battery temporary electrical power from an alternator failure. For an IFR flown plane, not doing the capacity test is needless risk taking in our opinion.

Other popular charger manufacturers have been so turned off by the problems presented by short lived aircraft batteries that they have actually stated on their Web sites that their products are not recommended

The 28252-AA-S4 exudes quality, and is an extraordinarily well thought out product that comes complete with everything you will need in accessories and snap-in probes to industrial type connector. Cables wrap around base.





Anderson SB-50 Gray to ELCON (optional)



GPU Anderson (optional)



11/32" Ring Terminals (optional)



Temperature/Voltage Sensor (At-the-Battery Sensor) (included)

Unit has multiple attachments. Above for use as a snap in power supply to standard two prong adapter for external battery attachment; to ring terminals for attaching to battery terminals; to battery temp sensor to assure battery charging temperature is controlled.

for aircraft batteries.

How can aircraft batteries be so different from automotive or marine batteries? They most definitely are different in the sense that they take far more of a beating in service and therefore need customized charging optimized for their design in order to last and to pass the required capacity checks. The reason is because aircraft batteries are minimally sized for the tasks they are required to handle in order to save weight, while simultaneously being undercharged chronically from prolonged sitting, improperly adjusted charging systems and short flights.

The aircraft battery is always under a maximal strain to keep up with the demands of avionics systems, which have only gotten more and more desirable and capable, requiring more and more juice to run them. While the latest avionics devices are more power efficient than old gear, we are adding more and more avionics to existing systems, often with generators or alternators that are inadequately sized (60 amps is very common on older planes and 100 amps on later planes being common).

The design of the charging system is to keep up with the demands of the

electrical system but with all these new bells and whistles it is often a losing game. The result is a battery that spends its life in two states—sitting around self-discharging between flights or barely trying to keep up with the electrical demands that airplanes require non-stop while operating with an undersized and likely under voltage charging system for the task.

With most flights less than two hours in duration the battery simply never catches up and dies a slow death of sulfation, which is greatly accelerated by partial discharge. Auto batteries have much greater capacity for any given application, no capacity testing requirement, and much lower demands as well as are generally used more frequently, all of which help the auto battery last longer. The aircraft battery is often never completely charged unless the plane is flown for several hours, *and* the electrical charging system is also up to par voltage wise. (If your charging voltage to the battery is in the neighborhood of 13.8 volts (27.6 volts), your battery is not being adequately charged under most temperature conditions unless you fly for hours at least every few weeks.)

And when you check that voltage, don't depend on an analog panel meter. Place a digital multimeter right on the battery terminals, and get in a safe position to see what voltage the battery is actually receiving. The issue is a few tenths of a volt system loss can make a big difference, especially on the

low end of the charging spectrum such as 13.8 volts.

From our experience most aircraft charging systems are set too low or too high (mostly too low). Too low undercharges the battery and too high cooks the battery by boiling out the electrolyte. Not all aircraft regulators have adaptive charging systems that change voltage with the change in temperatures, so the battery tends to get either too low a voltage in the winter and too high in the summer. Charging voltage needs to vary by the temperature by several tenths.

CHARGERS

The majority of chargers we have tested over the years do a fair job if carefully monitored, but tend to charge the battery a bit too aggressively since these chargers are made primarily for the greater amp hour capacity batteries found in the automotive world. Second, each and every charger we have ever tested other than VDC aircraft models trickle charged the battery at too high a voltage, which slowly boils out the electrolyte.

With a flooded battery to which the owner can add water, the electrolyte loss can be made up if the owner takes the time to check the battery periodically every week or two. In the case of an AGM or sealed battery there is no way to prevent electrolyte loss from too high a trickle charge voltage. With the trickle charge it's the excess voltage over time, not the current that does the damage.

With the cost of batteries

continuing to climb due to the ever-increasing price of lead and insatiable worldwide demand for autos (India and China), simply buying a new battery every few years is beginning to be an unacceptable easy way out. That goes double if you have a 24 volt system where a new battery can cost over \$250 a pop and is more susceptible to damage than its 12-volt brethren.

NEW USES AGGRAVATE THE PROBLEM

With the fancy glass panel avionics we see today, especially in the newer model aircraft, as well as high-end retrofit upgrades, owners are spending more time on the ground sitting in the cockpit just learning how to use these complicated systems. If they spend 30 minutes with the master avionics switch on while practicing, rather than flying, they have the ability to concentrate on what they are doing as well as avoiding the cost of boring holes in the sky just to learn the avionics—a big money saver.

If they simply shut down the master and walk away from the plane with the battery half discharged, this scenario guarantees a very short life for the battery and a failure at the first or second capacity check—or when the pilot really needs it during a charging system failure.

To combat this problem the owner can put his battery on a charger (providing he has access to 120-volt power) or remove and bring the battery home to charge it. Alternatively, a device has been available for a few years in the form of a dedicated power supply, typically around 20-25 amps at 24 volts that is easily plugged into the charging system.

These are terrific devices and allow the pilot to work on the avionics without sweating draining the battery. Outfits like Sportys have them for around \$389. Not cheap, but when you factor in saving battery as well as

saving engine running time, they pay for themselves in short order when you figure the hourly cost of flying for purposes of avionics training.

A GROUND-BREAKING NEW PARADIGM

What if you could build a battery charger that has this built in 25 amp power supply as well as a charging capability that has been blessed by both Concorde and Gill, and works faster, yet more thoroughly than any other device by a wide margin.

We are talking about a charger that with the combination of highly specialized computer chip programming as well as the use of temperature probes at the battery allows the charging of multiple batteries or even 12-volt batteries as long as they are hooked up in series of two batteries to allow the charger to see 24 volts. Note there are some stipulations on the batteries that can be hooked up together so that one battery is not overcharged while the other undercharged.

In the past the battery makers have recommended a low charging current rate to get the most thorough charge. With the combination of new charging profiles and temperature sensors it can charge at much higher currents while getting as effective or more charge on the battery at minimum time.

This new charger has a new, patented desulfation device that is much more robust and powerful than

any other on the market. It is designed to be done manually via a button press rather than all the time as it really is a battery saver of deeply sulfated batteries, not eyewash.

I tested it on a Concorde 24 volt AGM that had been sitting uncharged for two years. It had a voltage of 24.1 volts, which is deeply discharged and had been so for a long time, yet the desulfation circuit brought it back to successfully pass a capacity test. Note that not only deep discharges promote sulfation, but leaving a battery in the discharged state is about the worst type of sulfation promotion action mistake you can make.

This charger has another capability that is automatic, adding a stage to the charging profile. It has a built-in equalization circuit. Any one familiar with batteries will say you don't equalize a sealed battery, but VDC has successfully done so with the on-battery sensors and sophisticated internal programming. This type of

Only three buttons are needed for all functions. It's extremely easy to use.

BatteryMINDER®
Model 28252-AA-S4
Program Code r0.5

Avionic Power Supply / Charger / Desulfator
28-Volt @ 25 Amp

AVIATION-CALIBRATED
24-V AIRCRAFT BATTERY ONLY
FOR LEAD-ACID (Sealed or Wet Cell)
GA BATTERY ONLY
NOT for use with GILL LT Series or ODYSSEY Aircraft Batteries

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U.S. Patented & Patent Pending

Display (LCD) Error code table:

Output clips shorted or battery reverse connected	E01
Battery absent (needs to be in circuit) (Power Supply Mode)	E01
Soft Start timed out	E02
Bulk charging timed out	E03
Battery severely sulfated or damaged by age	E04
Fan faulty	E05
Charger shuts down by internal over-temperature protection	E06
Battery Temp. >131°F/55°C Resumes charge at <113°F/45°C	E07

NOTE:

- Unit automatically starts in charging mode.
- Press Power Supply button to operate as a power supply.
- Error codes are for Charging Mode only unless otherwise specified.

TO CHANGE THE MODE
If unit has not had a Mode changed within 30 seconds, press Mode Button TWICE, otherwise, press Mode Button ONCE.

Simplified Operating Instructions

The **BatteryMINDER** has no electrical output unless it is connected to a healthy battery with a minimum of 6-Volts.

- Attach Temperature/Voltage Sensor ABS-2825 firmly to battery terminal.
- Attach Battery Connector Attachments (BCA) to DC-CORD Output of unit.
- Plug AC Power Cord into 95 - 240 Vac electrical outlet. Turn AC POWER Switch On. Unit will automatically start in Charge Mode (expect up to a 10 second delay).
- Observe ERROR LED indicator. If lit RED, and LCD displays error code (E01), shut power off and reverse battery connector attachments on battery.
- Always power-off unit before disconnecting from battery(s).

WARNING! Fully understand Safety Instructions on our web site www.batteryminders.com before operating this unit.

FLOAT ● POWER ●
ABSORPTION and EQUALIZATION (FLASH) ● ERROR ●
BULK ● DESULFATION ●

CHARGE → VOLTAGE → AMP 5 → DESULFATION → AMP 5 → CHARGE → POWER SUPPLY → CHARGE

RoHS CE

circuit is very conducive to complete charging as well as prolonging the life of the battery significantly.

The unit is very powerful, providing 25 amps at 27 volts for either battery charging or as a power supply. Normally we would be sceptical of such a high powered charger being hard on flooded batteries (sealed AGM batteries can take this by design), but the secret is in the combination of the sophisticated circuitry and the temperature probe, which attaches to the battery. The batteries we tested it on never got hot during charging and charged much more quickly.

It is surprisingly easy to use and has all the protections you would expect in a high end unit such as reverse polarity protection, short circuit protection, plus sulfation diagnostics, battery thermal runaway protection and much more.

WHAT'S THE CATCH?

Performance wise, there is no catch.

This is a ground-breaking design with terrific capabilities that should easily double the effective life of your 24-volt batteries (and 12-volt batteries when hooked up as a twosome in series).

The power supply function allows you to work on training with the avionics systems at your leisure on the ground, knowing you are not discharging your battery and needlessly wearing it out.

While the suggested retail price may seem high at first glance, consider the two elements—saving flying hours, while saving your battery, and enabling your battery to pass the capacity test perhaps one or two more times than it would otherwise have done. If you run those numbers, you will likely find the new charger will pay for itself in a few years. Highly recommended. Note LPM has no financial arrangements or any affiliation with VDC electronics.

We are just really impressed by this product.

The BatteryMINDer Model 28252-AA-S4 is now available from VDC direct at www.BatteryMINDers.com, as well as several major resellers.